

## REMARKS

Reconsideration of this application as amended is respectfully requested. Claims 1-9, 38-47, 84-86, and 119-123 were pending. Claims 1-9, 38-47, 84-86, and 119-123 were rejected. Claim 84, 119, and 120 have been amended without introducing any new matter. No claims have been added or canceled. Thus claims 1-9, 38-47, 84-86, and 119-123 are pending.

The Examiner rejected claims 84-86 under 35 U.S.C. § 102(b) as being anticipated by Abdel-Malek et al. (U.S. Patent No. 5,497,777, hereinafter “Abdel-Malek”). The Applicants respectfully disagree because Abdel-Malek fails to describe each and every element as claimed in claims 84-86.

Abdel-Malek describes removing speckle noise to enhance an ultrasound image (Abdel-Malek, column 2, lines 26-55). A wavelet transform is applied to an ultra-sound image (Abdel-Malek, column 4, lines 21-43). After speckle noise is removed from the ultra-sound image using a threshold processor, Abdel-Malek describes using a “simple reverse” of the forward wavelet transform to reconstruct the ultra-sound image (Abdel-Malek, column 6, lines 8-41; Figure 2, element 42).

With respect to claim 84, as amended, the Applicants claim:

A method comprising:  
applying a forward wavelet transform to image data;  
performing denoising by thresholding coefficients generated by applying  
the forward wavelet transform to generate denoised coefficients;  
rescaling the denoised coefficients with a level-dependent parameter to  
sharpen or smooth the denoised coefficients; and  
filtering coefficients after rescaling.

As set forth above in claim 84, after thresholding the wavelet coefficients to remove noise, the wavelet coefficients are rescaled with a level-dependent parameter before being

filtered. However, Abdel-Malek fails to describe or suggest processing image coefficient data other than applying a threshold processor and applying a “simple” inverse wavelet transform (Abdel-Malek, column 6, lines 8-42). Therefore, Abdel-Malek fails to describe or suggest “performing denoising by thresholding coefficients generated by applying the forward wavelet transform to generate denoised coefficients; rescaling the denoised coefficients with a level-dependent parameter to sharpen or smooth the denoised coefficients; and filtering coefficients after rescaling.”

The Examiner further responded that “as disclosed in the applicant’s specification, at page 23, lines 12-13, corresponds to multiplication of coefficients by a multiplication factor. In Abdel-Malek, each coefficient is multiplied by a multiplication factor (column 6, lines 25-35), thereby proving a rescaling of coefficients” (Office Action, page 10). However, the multiplication described in Abdel-Malek (column 6, lines 25-35) simply refers to an inverse wavelet transform reconstructing image data from wavelet coefficients. The simple inverse wavelet transform is only described as “reconstruct[ing] the speckle removed data” and not to sharpening or smoothing wavelet coefficients.

Further, Abdel-Malek describes that after the inverse wavelet transform is performed, the image data is provided to a converter which converts the data for display in a wedge range-theta signal display device (Abdel-Malek, column 6, lines 40-49). Thus, after the data is subject to an inverse wavelet transform, the data is merely displayed. The Applicants however, claim, “performing denoising by thresholding coefficients generated by applying the forward wavelet transform to generate denoised coefficients; rescaling the denoised coefficients with a level-dependent parameter to sharpen or smooth the denoised coefficients; and filtering coefficients after rescaling.”

Therefore, the Applicants submit that Abdel-Malek fails to anticipate claim 84 under 35 U.S.C. § 102(b). Further, claims 85 and 86, which depend from claim 84, and contain additional features and limitations, are also not anticipated by Abdel-Malek under 35 U.S.C. § 102(b). The Applicants respectfully request withdrawal of the rejections.

The Examiner rejected claims 1, 2, 38-40, 120, and 121 under 35 U.S.C. § 103(a) as being obvious under International Publication WO 99/28865 of Decegama (hereinafter “Decegama”) in view of U.S. Patent No. 5,748,786 of Zandi et al. (hereinafter “Zandi”). The applicants respectfully disagree with the rejection because the references, alone or in combination, do not disclose each and every element of the invention as claimed in claims 1, 2, 38-40, 120, and 121.

Decegama describes applying a wavelet transform to an image in such a way as to better define edge regions in the image (Decegama, page 4, lines 1-6). To achieve this, Decegama adjusts coefficients generated by a wavelet transform which are associated with the edge regions of an image (Decegama, page 8, lines 9-32). As admitted by the Examiner, Decegama fails to describe or suggest a unit to sharpen or smooth text and image regions of the image data corresponding to the input image (Office Action, mailed 5/2/2006, page 3).

Zandi describes encoding and decoding data using reversible wavelet transforms (Zandi, Abstract). The wavelet transforms are utilized in a compression and decompression scheme for compressing various types of digital data (Zandi, Column 5, lines 45-57). One aspect of the compression scheme is the hierarchical decomposition of images into multiple resolutions through the use of reversible wavelet filters that may be used in analysis and enhancement systems (Zandi, Column 14, lines 31-48; Column 15, lines 6-9).

Claim 1 recites:

1. A system comprising:
  - a wavelet-based image processing path to enhance an input image in a wavelet domain, wherein the processing path includes a unit to sharpen or smooth text and image regions of the image data corresponding to the input image; and
  - a print engine coupled to the processing path.

As claimed in claim 1, the wavelet based processing path includes a unit to sharpen or smooth both text and image regions of the image. While Decagama describes processing edge regions, the Examiner admitted that Decagama fails to describe a unit to process text and image regions of an image. Zandi describes providing wavelet coefficients to an enhancement system with a hierarchical wavelet decomposition scheme. However, the only passage within Zandi that describes processing text and processing image states that the techniques of Zandi could be used to distinguish between text images and picture images (Zandi, Column 15, lines 16-19). Since Zandi only describes distinguishing image types, without further processing text images and picture images, Zandi also fails to describe or “a unit to sharpen or smooth text and image regions of the image data corresponding to the input image.”

Furthermore, the Examiner asserted that Zandi discloses this limitation citing Zandi at column 15, lines 23-25 (Office Action, page 10), which states “[s]harpening, edge enhancements, noise control, etc. may be performed using a hierarchical decomposition” (Zandi, column 15, lines 23-25). As noted above, however, Zandi describes classifying images as text or picture utilizing a hierarchical decomposition of wavelet coefficients, without describing performing enhancement operations on both text and image regions of an image (Zandi, Column 15, lines 11-19). Zandi then states that image processing, such as sharpening, could be accomplished using a hierarchical wavelet decomposition (Zandi, column 15, lines 22-24). However, Zandi again fails to describe performing any form of wavelet processing on both text and image regions of an image. Furthermore, Zandi does not describe the units that would

accomplish the wavelet based image processing, other than stating a hierarchical wavelet decomposition scheme could be utilized. As such, the Applicants respectfully disagree with the Examiner and submit that Zandi fails to describe or suggest “a unit to sharpen or smooth text and image regions of the image data corresponding to the input image.”

Thus, the Applicants respectfully submit that neither Decegama nor Zandi, alone or in combination, describe or suggest “a wavelet-based image processing path to enhance an input image in a wavelet domain, wherein the processing path includes a unit to sharpen or smooth text and image regions of the image data corresponding to the input image,” as claimed by the Applicants in claim 1. The applicants respectfully request withdrawal of the rejection.

Regarding independent claims 39 and 120, which include limitations similar to those discussed with respect to claim 1, Applicants respectfully submit that Decegama and Zandi, alone or in combination, also fail to render the claims obvious for similar reasons. Withdrawal of the rejection is respectfully requested.

Claims 2, 38, and 121 depend on claim 1, and claims 40 and 122 depend on claim 39. Furthermore, the dependent claims add additional features to those discussed above with respect to the independent claims. Since Decegama and Zandi, alone or in combination, fail to render claims 1 and 39 obvious, the references also fail to render claims 2, 38, 40, 121, and 122 obvious. Applicants respectfully request withdrawal of the rejections.

The Examiner rejected claims 39, 40 and 122 under 35 U.S.C. § 103(a) as being unpatentable over Abdel-Malek in view of Zandi. However, similar to the discussion above, the Examiner admits that Abdel-Malek fails to describe or suggest each and every limitation as claimed by the Applicants. Further, Zandi is used by the Examiner to provide for the noted deficiencies. However, similar to the discussion above, neither Abdel-Malek nor Zandi, alone or

in combination describe or suggest “sharpening or smoothing text and image data in the wavelet domain corresponding to the input image” as claimed by the Applicants in claims 39, 40, and 122. Thus, the Applicants respectfully request withdrawal of the rejections.

The Examiner Rejected claim 119 under 35 U.S.C. § 103(a) as being anticipated by Katayama et al. (U.S. Patent No. 5,905,579, hereinafter “Katayama”) in view of Zandi.

Claim 119 describes a copier which has a wavelet-based image processing path used to enhance an image “wherein the processing path includes a unit to sharpen or smooth text and image regions of the image data corresponding to the image data.” The Applicants respectfully submit that neither Katayama nor Zandi, alone or in combination, describe or suggest each and every element of amended claim 119.

The Examiner argued that Katayama described a copier having a wavelet-based image processing path for enhancing an image (Office Action, page 4, paragraph 5). However, the Examiner admitted that Katayama fails to describe or suggest a unit to sharpen or smooth text and image data. The Examiner cites Zandi as support for the missing limitation. However, similar to the discussion above, Zandi fails to describe or suggest a “processing path [that] includes a unit to sharpen or smooth text and image regions of the image data corresponding to the image data.”

Thus, Katayama and Zandi, alone or in combination, fail to describe or suggest each and every element as claimed by the applicants in amended claim 119. The Applicants respectfully submit that for at least the reasons discussed above, claim 119 is now in condition for allowance and such action is earnestly solicited.

The Examiner rejected claims 3 and 41 under 35 U.S.C. § 103(a) as being unpatentable over Decegama in view Zandi and further in view of Shapiro (U.S. Patent No. 5,412,741, hereinafter “Shapiro”).

As discussed above, the applicants respectfully submit that claim 1 and 39 are in condition for allowance. Since claims 3 and 41 depend indirectly on claims 1 and 39 respectively, and contain additional features that further limit claims 1 and 39, claims 3 and 41 are also in condition for allowance for at least the reasons discussed above with respect to claim 1 and 39.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) has been overcome by the amendments and the remarks. Applicants submit that claims 3 and 41 are now in condition for allowance and such action is earnestly solicited.

The Examiner rejected claims 4, 5, 42, and 43 under 35 U.S.C. § 103(a) as being unpatentable over Decegama in view Zandi and further in view of Chen et al (U.S. Patent No. 6,236,745).

As discussed above, the applicants respectfully submit that claims 1 and 39 are in condition for allowance. Since claims 4 and 5 depend indirectly on claim 1 and contain additional features that further limit claim 1, claims 4 and 5 are also in condition for allowance for at least the reasons discussed above with respect to claim 1. Furthermore, since claims 42 and 43 depend indirectly on claim 39 and contain additional features that further limit claim 39, claims 42 and 43 are also in condition for allowance for at least the reasons discussed above with respect to claim 39.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) has been overcome by the amendments and the remarks. Applicants submit that claims 4, 5, 42, and 43 as amended are now in condition for allowance and such action is earnestly solicited.

The Examiner rejected claims 6, 7, 44, and 45 under 35 U.S.C. § 103(a) as being unpatentable over Decegama in view Zandi and further in view of Creusere (U.S. Patent No. 6,148,111).

As discussed above, the applicants respectfully submit that claims 1 and 39 are in condition for allowance. Since claims 6 and 7 depend indirectly on claim 1 and contain additional features that further limit claim 1, claims 6 and 7 are also in condition for allowance for at least the reasons discussed above with respect to claim 1. Furthermore, since claims 44 and 45 depend indirectly on claim 39 and contain additional features that further limit claim 39, claims 44 and 45 are also in condition for allowance for at least the reasons discussed above with respect to claim 39.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) has been overcome by the amendments and the remarks. Applicants submit that claims 6, 7, 44, and 45 as amended are now in condition for allowance and such action is earnestly solicited.

The Examiner rejected claims 8 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Decegama in view Zandi and further in view of Kouri et al (U.S. Patent No. 6,847,737).

As discussed above, the applicants respectfully submit that claim 1 and 39 are in condition for allowance. Since claims 8 and 46 depend indirectly on claims 1 and 39 respectively, and contain additional features that further limit claims 1 and 39, claims 8 and 46 are also in condition for allowance for at least the reasons discussed above with respect to claim 1 and 39.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) has been overcome by the amendments and the remarks. Applicants submit that claims 8 and 46 as amended are now in condition for allowance and such action is earnestly solicited.

The Examiner rejected claims 9 and 47 under 35 U.S.C. § 103(a) as being unpatentable over Decegama in view Zandi and further in view of Muran (U.S. Patent No. 6,141,452).

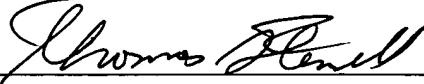
As discussed above, the applicants respectfully submit that claim 1 and 39 are in condition for allowance. Since claims 9 and 47 depend indirectly on claims 1 and 39 respectively, and contain additional features that further limit claims 1 and 39, claims 9 and 47 are also in condition for allowance for at least the reasons discussed above with respect to claim 1 and 39.

Accordingly, Applicants respectfully submit that the rejection under 35 U.S.C. § 103(a) has been overcome by the amendments and the remarks. Applicants submit that claims 9 and 47 as amended are now in condition for allowance and such action is earnestly solicited.

If there are any additional charges, please charge Deposit Account No. 02-2666 for any fee deficiency that may be due.

Respectfully submitted,  
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